

specific differences between allied species. While welcoming the restoration of *Esox* as a generic name for the pike—in consonance with Jordan and Evermann's own most recent work—one rather regrets that the author has not reconsidered the reasons which have caused American writers to separate the graylings from the Salmonidæ as a separate family, and to substitute *Stizostedium* for the *Lucioperca* of European authors.

The reader of this book is immediately struck by the great difference between the American and European fish fauna as viewed by the fisherman; among fresh-water forms the only Cyprinoid fish considered in any other light than as prospective bait is the introduced *Cyprinus carpio*, while the place occupied in England by Cyprinoids is taken by numerous species of Percidæ and Centrarchidæ, the only representatives of which in our waters are the common perch and the ruff. From the angler's point of view this is no slight gain, especially as some of the Centrarchidæ, notably the two species of "Black Bass," attain a large size and rise freely to an artificial fly. Justice is also done to the merits of the grayling, but hardly, we think, to the views of either English anglers or poets respecting it. Among the marine fishes, again, our American friends have very many Serranoid and Sciaenoid fishes to set against our bass, and numerous Sparoids where we have but one sea bream that can be considered an "angler's fish," but we find the grey mullets only mentioned as bait for other fish, and no species of Gadoid even mentioned. Mr. Holder is surely right, and the coalfish (the "pollack" of American writers) has not yet met with the recognition it deserves as a sporting fish.

It is, perhaps, hypercritical and unfair to complain of such a matter, but Dr. Henshall's language, especially in dealing with technical descriptions of tackle and gear, is not very intelligible to an Englishman, more especially when the great differences between English and American rods and lines are taken into account; it is a little startling to find an eight ounce rod recommended for pike fishing and puzzling to find no details as to the length and build of such a rod. A "chlorinated sea breeze" is apparently a special product of the western Atlantic, like the author's Bahama negro, for whose observations on fishes and their ways all Dr. Henshall's readers will be grateful.

We are reminded of a certain traveller's tale about a "mixed bag of wild fowl and hippopotami" when dealing with Mr. Holder's "Big Game Fishes," almost on the same line with Dr. Henshall's work; we pass from the grayling and the perch to the huge Serranoids of the Florida and California reefs, the tarpon, and the pelagic Scombridæ, the weights of which are reckoned by the hundredweight, and we pass, too, to descriptions of some of the most exciting fishing man can want. Unfortunately, the English sea fisherman must content himself with smaller game (unless he chooses to fish for the blue sharks, which are common enough off our western shores in the late summer), but a work like this should find readers outside the United States; the tunny and the albacore are within reach of British fishermen in the

Mediterranean, the American tarpon has its counterpart in the Indian Ocean, and huge Serranoids are not confined to American waters. If English or colonial readers should feel encouraged to try their hands at "big game fishing," they will find in Mr. Holder's book all the information they can desire as to the necessary tackle and baits to use, and the kind of place in which to use them, and if Mr. Holder's descriptions of this exciting form of sport do not encourage them to try their hands at it, we really do not know what will.

In marked contrast to Dr. Henshall, Mr. Holder gives no specific descriptions of the fish he deals with, and his only attempt at systematic or anatomical detail in his introductory chapter is not very happy; no reason is given for terming the shark "not a true fish," and to dismiss so important a structure from a systematic point of view as a fish's pectoral arch by saying that "many of the corresponding bones among higher animals are seen, as a pectoral arch, scapula, clavicle, ulna, and radius," is neither useful nor accurate.

The printing and get up of both books is excellent, and both are well illustrated, the one in black and white, the other in colours; the only fault to be found is that the process blocks of fishes have lost in clearness by being printed on rather too rough a paper, and that the figure of *Pseudopleuronectes* in Dr. Henshall's book is printed upside down; there are also in Mr. Holder's book certain references to a non-existent Fig. 9, which are apparently due to an oversight. The index in each case is very good. L. W. B.

TECHNICAL PHYSICS.

Lehrbuch der technischen Physik. By Prof. Dr. Hans Lorenz. Erster Band. Technische Mechanik Starrer Systeme. Pp. xxiv+625. (Munich: Oldenbourg, 1902.)

THIS book is interesting as the work of an engineer who is also a professor in one of the leading universities of Germany, where it is generally conceded that the science and practice of technical education are best understood, and have led in modern times to the most striking practical and commercial developments. The author rightly considers the fundamental principles of mechanics to be the groundwork of all physics, and has chosen mechanics as the subject of his first volume.

The most striking features of the book, as a whole, are the rigorous mathematical method of treatment adopted, the generality of the principles discussed, and the logical order of the arrangement. In an English "technical" text-book we should rather expect to find the practical applications in the foreground, and the general mathematical treatment of the principles either absent, or introduced only so far as was necessary for purposes of calculation, and not as the groundwork of the whole arrangement. Owing to the difficulty which many students find in appreciating general mathematical reasoning, we are inclined to make the mathematics as concrete and "practical" as possible, and to restrict it to the immediate applications required for illustrations. No doubt this may produce the best results, on the whole, in the case of

students whose abilities and opportunities are limited; but such students will probably not possess sufficient grasp of the mathematical principles to enable them to apply their knowledge to any new problem. Their training is "technical" in the English sense of the term. It may be questioned whether the German view of technical physics, as understood by the author of the present work, is not really the wiser and the more likely to lead to sound educational and commercial progress in the end.

The book begins with a general chapter on the geometry of motion. The idea of time is introduced in the next chapter on velocity and acceleration. This is followed by a chapter on relative motion, treating the usual examples, such as projectiles, planets, pendulum, oscillations, &c., in a very general manner. In chapter iv. we have mass and force introduced together with friction, damped oscillations, impact, work, and kinetic energy. In chapters v. and vi. we have a general discussion of the equations of motion in a plane, and in three dimensions, respectively, with a number of important applications, such as the theory of the precession of the earth's axis, the centrifugal governor, and the theory of models and dimensions.

The book concludes with a historical survey of the evolution of mechanical science divided into three sections:—(1) before Newton, (2) from Newton to Lagrange, (3) the later development of technical mechanics. This historical excursus would be unnecessary, from the teacher's point of view, for the mere inculcation of the principles of the subject, and would interfere with the logical order of ideas. But from the student's point of view such a historical survey is not only extremely interesting, but also most instructive. Correct ideas can only be appreciated in their true significance by contrast with incorrect conceptions, such as abound in the earlier history of the subject; and the methods and principles at which we have arrived at the present stage of progress are not in all probability the best expression of the science, but are the outcome of an intricate process of evolution along certain lines. To appreciate them fully it is necessary to know something of the manner in which they have been evolved.

It is probable that the English engineer would hesitate before devoting much time to the study of a foreign text-book which at first sight is of so "unpractical" a nature. But the mere existence of the book in its present form suggests a lesson which our technical educators may have yet, in some cases, to learn.

H. L. C.

OUR BOOK SHELF.

An Introduction to Botany. By W. C. Stevens. Pp. 428; with preface and index and key, 121 pp. and index. (New York and London: D. C. Heath and Co., 1903.) Price 6s.

AMONG the numerous works professing to guide the elementary student through the mazes of botanical science, this may claim several advantages, inasmuch as the greater part of the book is based on a sound conception of the method best suited for the purpose of training the beginner to observe and think for himself. It is the method which Huxley worked so hard to introduce into this country many years ago, namely, that of encouraging the student to investi-

gate first, and then telling him more about the things he has seen, keeping the opinions and records of others in the background until he has acquired a stock of his own knowledge to work upon.

On the whole the purpose of the book is carried out, but the figures are often very poor, and the part dealing with systematic botany frankly returns to the old lines, and is, moreover, only suited to American students. Why this part should be separately pagged is not clear; it necessitates a second index, and makes the book somewhat cumbersome. English students will find far better exercises in the use of analytical keys and floristic work generally in Hooker and Bentham's well-known "Flora."

Kant's Lehre vom Glauben. By Ernst Sanger. Pp. xvii+170. (Leipzig: Verlag der Durr'schen Buchhandlung, 1903.) Price 3 marks.

KANT's philosophy has found, and continues to find, various application and still more various interpretation. The diversity of commentaries has led, in some quarters especially, to a feeling that Kant has received enough development, that in some cases the development has been too much controlled by the ideas of later systems, that, in fact, we must go back to Kant and define more clearly our ideas of what he really said. The present essay is obviously designed to assist that process. If we except the last section, which makes reference to the relation between Kant's doctrine and theology, the entire essay is confined to collecting Kant's statements and piecing together his doctrine of belief from the original sources. The author has clearly spared no pains to make his collection of passages complete, nor has he failed to point out the significance of Kant's distinctions or his variations in the use of terms. For the purpose indicated, it was necessary to follow the historical order; the result is a monograph not, perhaps, eminently readable, but deserving study. Though the author's reference seems to be especially to that scientific theology which ever finds it a primary duty to accept or answer Kant, his essay cannot fail to be of value to all interested in philosophy. His remarks on the various passages show clearly how the doctrine of belief runs through all Kant's work, and how its elucidation throws light on the structure and purpose of all his writings. An introduction by Prof. Dr. Hans Vaihinger will doubtless appear to many an adequate recommendation.

G. S. B.

Elementary Physics. Practical and Theoretical. Second Year's Course. By John G. Kerr, M.A., LL.D., and John N. Brown, A.R.C.Sc. (Lond.). Pp. 169. (London: Blackie and Son, Ltd., 1903.) Price 2s

THE practical exercises here brought together are intended for young students who have already had a year's work in experimental physics. Dynamics, heat and light are the only branches of the subject drawn upon, and presumably the learner is expected to wait until his third year before he may hope to become acquainted, from his own experiments, with the fundamental principles of sound, electricity, and magnetism. The exercises are well arranged and the instructions given are sensible and helpful, and show that the authors are teachers of experience. The student is more likely to obtain good results if a simple sighting apparatus is used in counting vibrations of the pendulum, but no instructions appear to be given as to the use of one. On p. 64 the student is told to hang a 50-gram weight to a thread for use in his experiment, which necessitates handling the weight, a bad habit which the teacher should discourage as much as possible. A want of uniformity in the spelling of gram should be corrected in the next edition. But, on the whole, the book is likely to prove useful.